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(54) **ROAD LIGHTING AND DELINEATING APPARATUS**

STRASSENBELEUCHTUNGS- UND EINGRENZUNGSSYSTEM

APPAREIL D'ÉCLAIRAGE ET DE DÉLIMITATION DE ROUTE

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Description

[0001] This invention refers to devices and apparatuses for illuminating outdoor areas intended to the vehicle circulation, like roads and expressways, and more specifically concerns a road lighting and delineating apparatus in conformity with the principles and criteria outlined in the Italian regulations of the sector, defined by the UNI 11248 "Road lighting" standard.

[0002] Illumination, whether indoor or outdoor, constitutes a fundamental element for guaranteeing safety and visual comfort. The outdoor lighting apparatus known and widely used for road lighting, like lampposts, street light towers, street lights, generally include a supporting pole or bracket, with one end fixed to the ground or to an adjacent construction and the other end destined to sustain a housing for a light source selected, for example, among incandescent light bulbs, high-pressure mercury vapor light bulbs, high- or low- pressure sodium vapor lamps, LED lamps.

[0003] The poles must be tall enough to position the light source at a height sufficiently elevated to allow the uniform illumination of the roadway, in total compliance with all legal requirements, and with a section diameter that grants sturdiness and stability to the entire lighting apparatus. More in detail, the law requires that the poles have variable heights according to the type of use, for example heights comprised between 8 and 12 meters for road and expressway lighting, so that the driver of a vehicle has optimal perception of both the roadway layout and the stopping distance from a potential obstacle present along the traveling lane or on the carriageway.

[0004] Although there are still partially widespread obsolete structures made with concrete supports with iron rebar, nowadays the poles are made mainly of steel. As an alternative, the use of fiberglass makes it possible to obtain very lightweight poles that are easily handled, but having larger section diameters and therefore requiring very bulky supports, while the use of aluminum ensures a better guarantee of durability over time and is easier to work with, consequently this material can take on a wide variety of shapes, which is very popular in urban settings, but also implies higher production costs.

[0005] The need to position the light source at such a height using these supporting structures constitutes, however, one of the main disadvantages of known lighting apparatus.

[0006] Above all, the light source positioned at a considerable height makes the maintenance thereof complex and in some cases dangerous. Indeed, when there is a breakdown or a malfunction of the lighting, a maintenance technician must reach the light source by climbing up the relative supporting pole or using a lift truck, thereby exposing himself to all the dangers that the option selected implies. Moreover, if ever the light source should detach from the supporting pole, for example in an area subject to strong gusts of wind, there is a very serious risk that it strikes either a vehicle or a person with a force

directly proportional to its fall.

[0007] Secondly, the higher the position of the light source, the greater the probability that, in the presence of rain or fog, one or more dark zones or the so-called veiling luminance may appear on the asphalt, respectively. It is indeed known that the rain settled on the asphalt gives rise to zones that appear black to an observer, in particular where the lighting apparatus, the eye of the observer and the roadway are aligned (i.e. at the critical angle or angle of Brewster), due to the fact that the light is reflected by the road surface outside of the observer's own field of view. The fog and, more specifically, the water vapor particles that constitute it instead have the power to diffuse the light emitted by the light source; this diffused light produces a luminous halo that overlaps the entire observed image, decreasing the contrast and, in the specific case of roads and expressways, reducing the distance of visibility and the traffic safety.

[0008] Furthermore, the use of supporting structures for light sources positioned just close to the road or expressway may be dangerous. In effect, if by some misfortune a driver loses control of his vehicle, the impact against one or more supporting structures may lead to very serious or even fatal consequences for the driver and for any potential passengers in the vehicle.

[0009] Finally, cases in which the known lighting apparatus do not constitute the optimal solution for lighting and delineating roads and expressways intended for vehicle traffic are not negligible. For example, known supporting structures may prove to be inadequate under extreme climatic conditions and/or in the case of regulatory problems like, for example, in the vicinity of airports.

[0010] WO 2015/062863 discloses a lighting device for roads comprising a reflector provided with an elliptical shaped light emission window. The reflector further comprises a cavity surrounded by light reflecting walls which extend between a light emission window and a light source, such as a LED type source. Furthermore the window is provided with an optical plate having an outcoupling structure facing towards the light source and realized by a plurality of prisms suitable alternatively for refracting and reflecting the light.

[0011] An object of the present invention is to improve the known lighting apparatus for illuminating and delineating outdoor areas, like streets and expressways, intended for vehicle traffic, in particular to realize a road lighting and delineating apparatus that is in conformity with the regulations of the sector, free from the drawbacks described above and at the same time simple and economical to construct.

[0012] Another object is to provide a road lighting and delineating apparatus with moderate dimensions, with no supporting pole or bracket and suitable to be installed on essentially vertical surfaces like, for example, a tunnel wall, the surface of a Jersey barrier, or the band of a guardrail.

[0013] Yet another object is to realize a road lighting and delineating apparatus that improves visual comfort,

and hence traffic safety, and supports the orientation of the driver under any weather conditions and, in particular, in the presence of rain and/or fog.

[0014] Another further object is obtain a road lighting and delineating apparatus that does not constitute an obstacle in case of impact by a vehicle, thereby minimizing the consequences for both the driver and the passengers of the vehicle in question.

[0015] These and other objects are achieved by a road lighting and delineating apparatus according to one or more of the claims reported below.

[0016] The present invention can be better understood and actuated with reference to the attached drawings that represent a non-limiting exemplary embodiment, wherein:

- Figure 1 is a perspective view of a first embodiment of the road lighting and delineating apparatus according to the present invention;
- Figure 2 is a perspective view of the road lighting and delineating apparatus of Figure 1, with some parts removed for the sake of clarity;
- Figure 3 is a side view of a second embodiment of the road lighting and delineating apparatus according to the present invention;
- Figure 4 is a side view of the road lighting and delineating apparatus of Figure 1;
- Figure 5 is a side view of the road lighting and delineating apparatus of Figure 1, mounted on a guardrail;
- Figure 6 is a perspective view of two road lighting and delineating apparatus according to the present invention mounted on a guardrail;

[0017] The figures illustrate a road lighting and delineating apparatus 1 according to the present invention, which can be installed on a supporting structure 10 at a set installation height H from a road surface S, which includes a central body 2 with a molded part 21 and a frontal wall 22 that is substantially transparent. The central body 2 has an elongated shape, more specifically the shape of a rectangular parallelepiped with a trapezoidal section, extends in a longitudinal direction A and is provided with a cavity 23 with an opening 25 on at least one of two sides 24 opposed to each another and transversal to said longitudinal direction A. The molded portion 21 and the frontal wall 22 may be in a single body or the central body 2 may form a monolithic element. As an alternative, the molded portion 21 and the frontal wall 22 can be separated and destined to be coupled to form the central body 2 with the cavity 23.

[0018] The molded portion 21 of the central body 2 is equipped with an external seat 20, that in the embodiments illustrated in the figures is opposite the frontal wall 22, and can be engaged with a fixing element 27, comprising for example a bracket intended to be fixed in an adjustable and reversible way to the supporting structure 10, such as the wall of a tunnel, a surface of a Jersey

barrier, a band of a guardrail, as in the example illustrated. In this latter case, the bracket 27 can be fixed by using a suitable bolt in a slot present on the lower curve of the band of the guardrail 10 as illustrated in Figures 5 and 6, or by means of a suitable clamp when the bracket has the same shape as the profile of the guardrail 10 itself. In the particular case in which the molded portion 21 of the central body 2 has a shape that is complementary to that of the lowest curve of the guardrail 10 profile, more generally speaking, complementary to the shape of the longitudinal cavity 11 of the generic supporting structure 10, the central body 2 can be housed in this latter in a compact assembly configuration G that is particularly advantageous, in which the volume of the apparatus 1 is notably reduced, in particular without protruding from the guardrail itself.

[0019] Moreover, the bracket 27 can be fixed in an adjustable way to the supporting structure 10, in a way known by a person skilled in the field and not further explained here in detail, in such a way as to be able to suitable orient the apparatus 1, in particular inclining it on a vertical plane of an angle, for example of 15°, according to said installation height H from the road surface S. Consequently, the apparatus 1 can be positioned at a set installation height H according to particular road conformations, like curved stretches that require specific attention in controlling the lighting, especially at an installation height H less than 150 cm, for instance equal to 80 cm.

[0020] The road lighting and delineating apparatus 1 includes at least one blind plug 3 with an operational surface 30, designed to be reversibly coupled with the central body 2 at said opening 25 so as to close, preferably hermetically, the cavity 23. In the embodiments illustrated in figures 1 to 4, the central body 2 is provided with a plurality of threaded holes while the blind plug 3 is provided with a corresponding plurality of through holes; in this way the coupling can be simply carried out by means of screws that pass through the holes of the blind plug 3 and screw into the threaded holes of the central body 2. Alternatively, the blind plug 3 can be coupled with the central body 2 by interlocking or using magnetic coupling devices.

[0021] The operational surface 30, when the blind plug 3 is coupled with the central body 2, faces outward from the cavity 23 and is intended to house a road delineating system, for example a passive signaling system namely a reflector or retroreflector 31 to signal the presence of an obstacle as represented by the supporting structure 10 to which the apparatus 1 is fixed or the apparatus 1 itself. As an alternative, the operational surface 30 can house an active road delineating system, as depicted in the second embodiment illustrated in Figure 3, for example, a module or board 32 with a plurality of further LEDs 33 to delineate exits, curves, dangerous stretches, rotaries, intersections, to support the orientation of a driver in case of fog and warn him promptly of the presence of accidents or roadway construction sites.

[0022] With reference to Figure 4, a lighting system 4 is housed inside the cavity 23 and comprises at least one LED 41 adapted to emit light rays L, to which a refractive lens 43 and a reflective optical system 44 are associated.

[0023] The LED 41 is mounted on a respective printed circuit 47 which is slidably coupled to the supporting means 42 positioned inside the cavity 23 and connected to the central body 2, for example to a rear wall 26 of the molded portion 21 opposite the frontal wall 22. As a consequence, the printed circuit 47 that is the LED 41, sliding along the supporting means 42, can be stably positioned in a suitable position inside the cavity 23. The supporting means 42 are also conveniently constructed in thermally conductive material, for example in aluminum, so as to act also as a heat sink for the printed circuit 47.

[0024] The printed circuit 47 is equipped with a length of cable, not shown in the figure, that comes out of the apparatus 1 through, for example, a gland for the connection to an electric grid system or to power supplying means for the LED 41.

[0025] The refractive lens comprises for example a plastic refractive lens 43 and is suitably molded according to the LED 41 to emit a light flux F directed towards the frontal wall 22. More in detail, the refractive lens 43 shows a substantially elliptic section on a primary plane P1 and an asymmetric oblong section on a secondary plane P2 almost perpendicular to the primary plane P1. In a centered optical system, for which an optical axis is defined, as is known to a person expert in the field, two luminous homocentric rays that propagate along respective directions that lay on the primary plane P1 and are symmetric to each other in relation to the optical axis (by definition the optical axis joins the geometric center of the refractive lens 43 and the center of the rays), by impinging on the refractive lens 43 they propagate along directions that are still symmetrical in relation to the optical axis itself. On the contrary, two luminous homocentric rays that propagate along respective directions that lay on the secondary plane P2 and symmetric to each other in relation to the optical axis, by impinging the refractive lens 43 they propagate along whichever directions that do not follow any law of symmetry. The coupling of the LED 41 with the respective refractive lens 43 thereby determines a suitable photometric solid, in conformity with the regulations of the sector, with a direction of maximum luminous intensity. Orienting the refractive lens so that the secondary plane P2 is almost perpendicular to the road surface S, the direction of maximum luminous intensity can be suitably directed towards the frontal wall 22 and graze the road surface S itself.

[0026] The reflective optical system 44, responsible for optimizing the overall performance of the apparatus 1, comprises a reflecting body 45 and a couple of fins 46. Preferably, the reflecting body 45, on a plane orthogonal to the primary plane P1 and secondary plane P2, has a parabolic cross section that extends along the longitudinal direction A and is secured to the printed circuit 47 or to the heat sink. More specifically, the section of the re-

flective optical system 44 is asymmetrical, as it is shorter on one of the two branches of the parabola, advantageously on the branch closest to the road surface S as in the embodiment illustrated in Figures 4 and 5.

[0027] The reflecting body 45 and the fins 46 are equipped with respective reflecting surfaces, for example in silver-coated aluminum with high performance (greater or equal to 98%), which constitute an internal surface of said hollow body. In this way, the reflective optical system 44 is capable of reflecting part of the light flux F emitted by each refractive lens 43 and potentially dispersed, and directing also this part towards the frontal wall 22. Moreover, the fins 46 have the further function of reducing the potential dazzle generated by each refractive lens 43. As a consequence, the dispersion of light is limited and the overall performance of the apparatus 1 is optimized.

[0028] When the road lighting and delineating apparatus 1 is positioned at the set installation height H, the light rays L emitted by the LED 41 are refracted by the refractive lens 43 and reflected by the reflective optical system 44 in order to obtain the light flux F that is grazing said road surface S and conform to the regulations of the sector.

[0029] In a different embodiment, the apparatus 1 according to the present invention comprises a plurality of LEDs 41 distributed along a direction parallel to the longitudinal direction A, preferably equidistant from one another. These LEDs 41 can be mounted on a printed circuit 47 or on respective printed circuits 47, in both cases a respective refractive lens 43 and a respective reflective optical system 44 being associated to each LED 41.

[0030] The apparatus 1, being positioned at a set installation height H less than 150 cm, for example equal to 80 cm, and comprising the lighting system 4 described above, is capable of emitting a light flux F that grazes the road surface S and at the same time is capable of containing dazzle within the limits established by current regulations. Hence the use of a road lighting and delineating apparatus 1 according to the present invention presents the notable advantage of improving visual comfort, or traffic safety, and supporting the driver's orientation under any weather conditions and, in particular, in the presence of rain and/or fog.

[0031] Moreover, in case of vehicle impact, thanks to the fixing system described above, the apparatus 1 according to the present invention, is capable of easily detaching from the supporting element, for example from the guardrail band to which it is fixed, and falling to the ground without obstructing the vehicle itself, thereby advantageously minimizing the consequences of a vehicle impact for both the driver and for the passengers.

[0032] Finally, the road lighting and delineating apparatus 1 according to the present invention requires no supporting pole or bracket, thereby presenting limited dimensions and can be designed in a variety of lengths to meet performance needs.

Claims

1. Road lighting and delineating apparatus (1) that can be installed on a supporting structure (10) at a set installation height (H) from a road surface (S), comprising a central body (2) with an elongated shape, extending in a longitudinal direction (A) and provided with a cavity (23), and a lighting system (4) housed inside said cavity (23) and comprising:

- at least one LED (41) mounted on a respective printed circuit (47) fixed to supporting means (42) positioned inside the cavity (23) and connected to said central body (2), said at least one LED (41) being adapted to emit light rays (L);
- a refractive lens (43) and a reflective optical system (44) that are associated to said at least one LED (41);

wherein said refractive lens (43) shows a substantially elliptic section on a primary plane (P1) and an asymmetric oblong section on a secondary plane (P2) almost perpendicular to said primary plane (P1) and to said road surface (S), said light rays (L) emitted from said at least one LED (41) being refracted by said refractive lens (43) and reflected by said reflective optical system (44) in order to obtain a light flux (F) grazing said road surface (S) when said road lighting and delineating apparatus (1) is positioned at said set installation height (H), **characterized in that** said reflective optical system (44) is further able to reduce a dazzle generated by said refractive lens (43), and **in that** said printed circuit (47) is slidably coupled to said supporting means, said at least one LED (41) being able to be positioned in suitable positions inside said cavity (23).

2. Road lighting and delineating apparatus (1) according to claim 1, wherein said reflective optical system (44) comprises a reflecting body (45) and a couple of fins (46), said reflecting body (45) being secured to said printed circuit (47) and extending along said longitudinal direction (A), said fins (46), in particular substantially bi-dimensional and with triangular shape, being arranged perpendicularly to said longitudinal direction (A) and coupled to two opposed sides of said reflecting body (45).
3. Road lighting and delineating apparatus (1) according to claim 2, wherein said reflecting body (45) has a parabolic cross section.
4. Road lighting and delineating apparatus (1) according to any preceding claim, wherein said reflective optical system (44) is provided with reflecting surfaces made of silver-coated aluminum with high performance.

5. Road lighting and delineating apparatus (1) according to any preceding claim, further comprising at least one blind plug (3) with an operational surface (30), wherein said cavity (23) is provided with an opening (25) on at least one of two sides (24) opposed to each another and transversal to said longitudinal direction (A), said blind plug (3) being designed to be reversibly coupled with said central body (2) at said opening (25).
6. Road lighting and delineating apparatus (1) according to claim 5, wherein said operational surface (30), when said blind plug (3) is coupled with the central body (2), faces outward from said cavity (23) and is intended to house a road delineating system.
7. Road lighting and delineating apparatus (1) according to any preceding claim, wherein said central body (2) is provided with an external seat (20) that can be engaged by a fixing element (27) and is intended to be fixed in an adjustable and reversible way to said supporting structure (10) in order to orient said apparatus (1) according to said set installation height (H).
8. Road lighting and delineating apparatus (1) according to any preceding claim, wherein said installation height (H) is less than 150 cm, for instance equal to 80 cm.
9. Road lighting and delineating apparatus (1) according to any preceding claim, comprising a plurality of LEDs (41) mounted on a printed circuit (47), a respective refractive lens (43) and a respective reflective optical system (44) being associated to each of the LEDs (41) of said plurality of LEDs.
10. Road lighting and delineating apparatus (1) according to any preceding claim, comprising a plurality of LEDs (41) mounted on respective printed circuits (47), a respective refractive lens (43) and a respective reflective optical system (44) being associated with each of the LEDs (41) of said plurality of LEDs.
11. Road lighting and delineating apparatus (1) according to claim 9 or 10, wherein said LEDs (41) of said plurality of LEDs are distributed along a direction parallel to said longitudinal direction (A).
12. Road lighting and delineating apparatus (1) according to any preceding claim, wherein said central body (2) has shape complementary to the shape of a longitudinal cavity (11) of said supporting structure (10) in order to be housed in the latter in a compact assembly configuration (G).

Patentansprüche

1. Straßenbeleuchtungs- und -markierungsvorrichtung (1), die auf einer Trägerstruktur (10) in einer festgelegten Installationshöhe (H) von einer Straßenoberfläche (S) installiert werden kann, aufweisend einen zentralen Körper (2) mit einer länglichen Form, der sich in einer Längsrichtung (A) erstreckt und mit einem Hohlraum (23) versehen ist, und ein Beleuchtungssystem (4), das innerhalb des Hohlraums (23) untergebracht ist und folgendes aufweist:
 - mindestens eine LED (41), die auf einer zugehörigen gedruckten Schaltung (47) montiert ist, die an Trägermitteln (42) befestigt ist, die innerhalb des Hohlraums (23) angeordnet und mit dem zentralen Körper (2) verbunden sind, wobei die mindestens eine LED (41) ausgebildet ist, Lichtstrahlen (L) auszusenden;
 - eine brechende Linse (43) und ein reflektierendes optisches System (44), die der mindestens einen LED (41) zugeordnet sind;
 wobei die brechende Linse (43) einen im Wesentlichen elliptischen Querschnitt auf einer primären Ebene (P1) und einen asymmetrischen länglichen Querschnitt auf einer sekundären Ebene (P2), die nahezu senkrecht zu der primären Ebene (P1) und zu der Straßenoberfläche (S) ist, aufweist, wobei die von der mindestens einen LED (41) ausgesandten Lichtstrahlen (L) durch die brechende Linse (43) gebrochen und durch das reflektierende optische System (44) reflektiert werden, um einen Lichtstrom (F) zu erhalten, der die Straßenoberfläche (S) streift, wenn die Straßenbeleuchtungs- und -markierungsvorrichtung (1) in der festgelegten Installationshöhe (H) positioniert ist, **dadurch gekennzeichnet, dass** das reflektierende optische System (44) zudem in der Lage ist, eine durch die brechende Linse (43) erzeugte Blendung zu reduzieren, und dass die gedruckte Schaltung (47) verschiebbar mit den Trägermitteln gekoppelt ist, wobei die mindestens eine LED (41) in geeigneten Positionen innerhalb des Hohlraums (23) positioniert werden kann.
2. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach Anspruch 1, wobei das reflektierende optische System (44) einen reflektierenden Körper (45) und ein Paar von Rippen (46) aufweist, wobei der reflektierende Körper (45) an der gedruckten Schaltung (47) befestigt ist und sich entlang der Längsrichtung (A) erstreckt, wobei die Rippen (46), insbesondere im Wesentlichen zweidimensional und mit dreieckiger Form, senkrecht zu der Längsrichtung (A) angeordnet und mit zwei gegenüberliegenden Seiten des reflektierenden Körpers (45) gekoppelt sind.
3. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach Anspruch 2, wobei der reflektierende Körper (45) einen parabolischen Querschnitt besitzt.
4. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei das reflektierende optische System (44) mit reflektierenden Oberflächen aus silberbeschichtetem Aluminium mit hoher Leistung versehen ist.
5. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, zudem aufweisend mindestens einen Blindstopfen (3) mit einer Betriebsfläche (30), wobei der Hohlraum (23) auf mindestens einer von zwei einander gegenüberliegenden und quer zu der Längsrichtung (A) verlaufenden Seiten (24) mit einer Öffnung (25) versehen ist, wobei der Blindstopfen (3) so ausgebildet ist, dass er an der Öffnung (25) reversibel mit dem zentralen Körper (2) gekoppelt werden kann.
6. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach Anspruch 5, wobei die Betriebsfläche (30), wenn der Blindstopfen (3) mit dem zentralen Körper (2) gekoppelt ist, von dem Hohlraum (23) nach außen weist und zur Aufnahme eines Straßenmarkierungssystems bestimmt ist.
7. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der zentrale Körper (2) mit einem äußeren Sitz (20) versehen ist, der von einem Befestigungselement (27) in Eingriff gebracht werden kann und dazu bestimmt ist, auf einstellbare und reversible Weise an der Trägerstruktur (10) befestigt zu werden, um die Vorrichtung (1) entsprechend der festgelegten Installationshöhe (H) auszurichten.
8. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei die Installationshöhe (H) weniger als 150 cm, zum Beispiel gleich 80 cm, ist.
9. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, aufweisend eine Mehrzahl von LEDs (41), die auf einer gedruckten Schaltung (47) montiert sind, wobei jeder der LEDs (41) der Mehrzahl von LEDs eine zugehörige brechende Linse (43) und ein zugehöriges reflektierendes optisches System (44) zugeordnet sind.
10. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, aufweisend eine Mehrzahl von LEDs (41), die auf zugehörigen gedruckten Schaltungen (47) montiert sind, wobei jeder der LEDs (41) der Mehrzahl

von LEDs eine zugehörige brechende Linse (43) und ein zugehöriges reflektierendes optisches System (44) zugeordnet sind.

11. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach Anspruch 9 oder 10, wobei die LEDs (41) der Mehrzahl von LEDs entlang einer Richtung parallel zu der Längsrichtung (A) verteilt sind.
12. Straßenbeleuchtungs- und -markierungsvorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der zentrale Körper (2) eine Form besitzt, die komplementär zu der Form eines Längshohlraums (11) der Trägerstruktur (10) ist, um in letzterer in einer kompakten Montagekonfiguration (G) untergebracht zu werden.

Revendications

1. Appareil (1) d'éclairage et de délimitation de route qui peut être installé sur une structure de support (10) à une hauteur d'installation (H) définie par rapport à une surface de route (S), comprenant un corps central (2) avec une forme allongée, s'étendant dans une direction longitudinale (A) et doté d'une cavité (23), et un système d'éclairage (4) reçu à l'intérieur de ladite cavité (23) et comprenant :

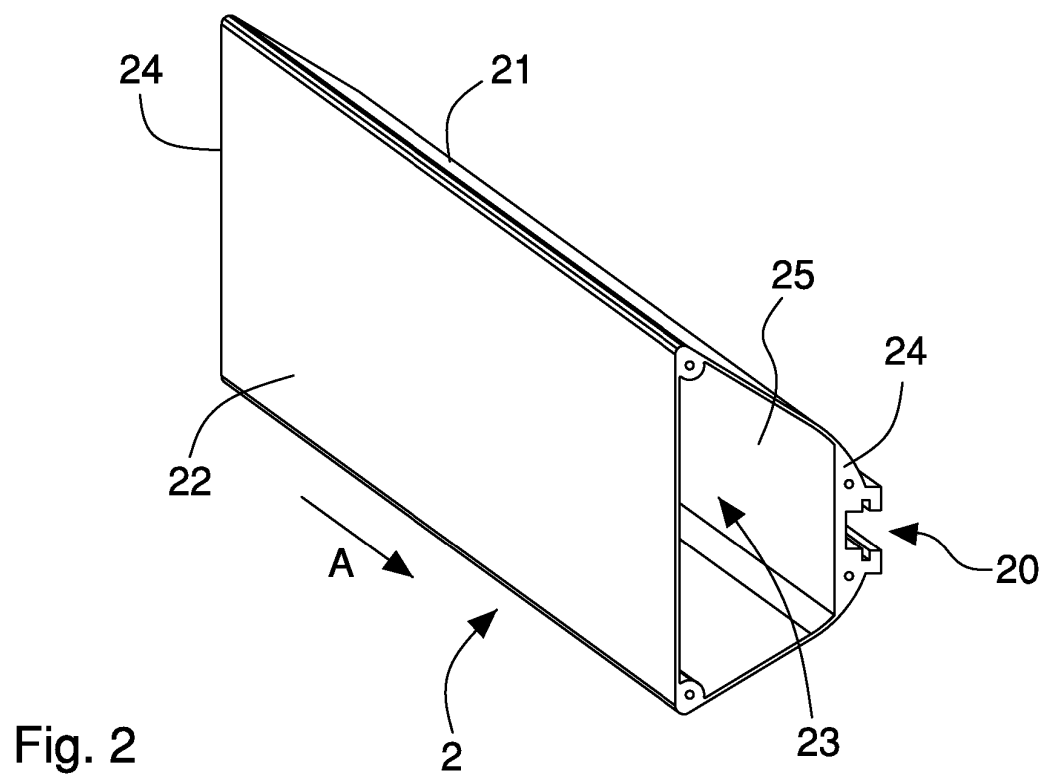
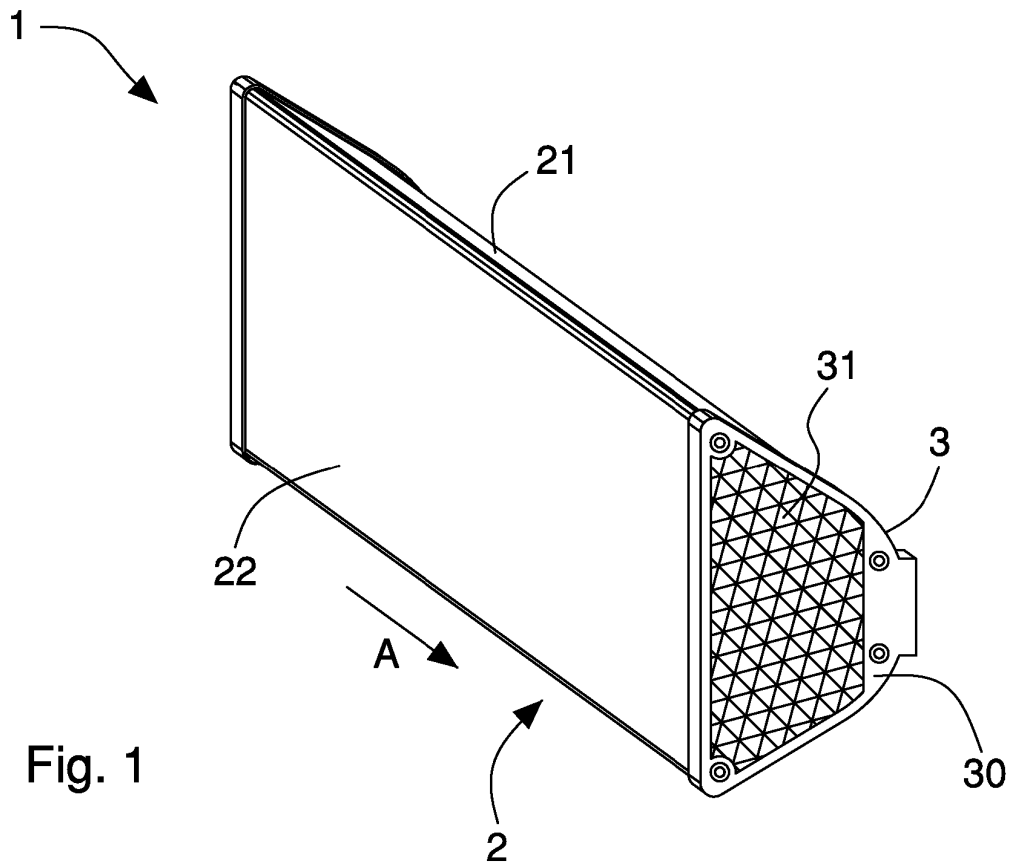
- au moins une DEL (41) montée sur un circuit imprimé (47) respectif fixé à des moyens de support (42) positionnés à l'intérieur de la cavité (23) et connectés audit corps central (2), ladite au moins une DEL (41) étant adaptée pour émettre des rayons lumineux (L) ;
- une lentille de réfraction (43) et un système optique réflecteur (44) qui sont associés à ladite au moins une DEL (41) ;

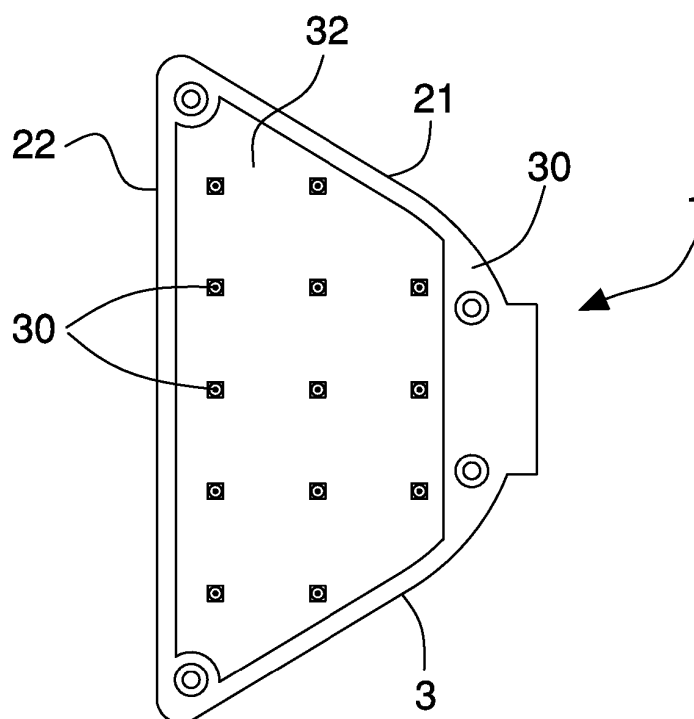
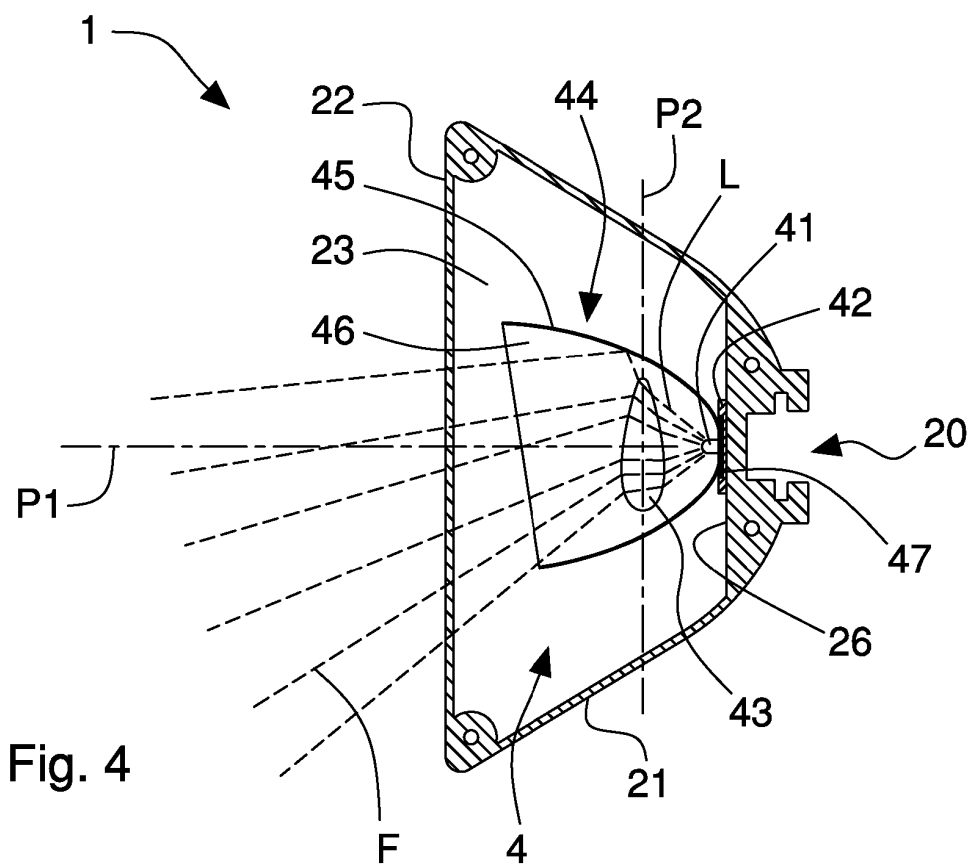
dans lequel ladite lentille de réfraction (43) présente une section sensiblement elliptique sur un plan primaire (P1) et une section oblongue asymétrique sur un plan secondaire (P2) presque perpendiculaire audit plan primaire (P1) et à ladite surface de route (S), lesdits rayons lumineux (L) émis à partir de ladite au moins une DEL (41) étant réfractés par ladite lentille de réfraction (43) et réfléchis par ledit système optique réflecteur (44) afin d'obtenir un flux lumineux (F) effleurant ladite surface de route (S) lorsque ledit appareil (1) d'éclairage et de délimitation de route est positionné à ladite hauteur d'installation (H) définie, **caractérisé en ce que** ledit système optique réflecteur (44) est en outre capable de réduire un effet éblouissant généré par ladite lentille de réfraction (43), et **en ce que** ledit circuit imprimé (47) est accouplé de manière coulissante auxdits moyens de support, ladite au moins une DEL (41) étant capable d'être po-

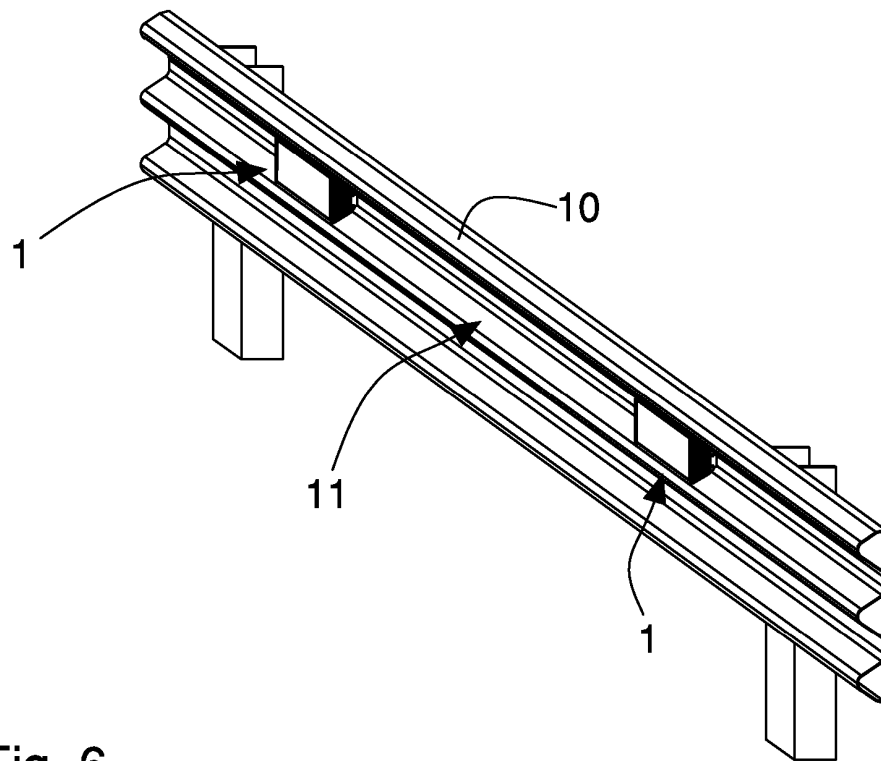
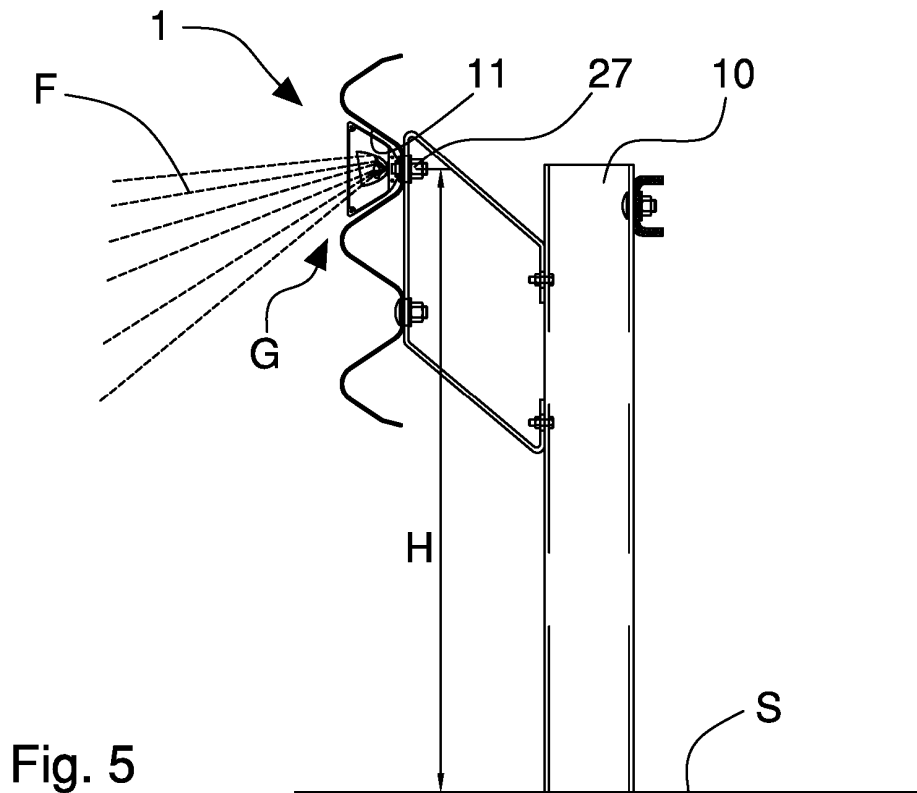
sitionnée dans des positions appropriées à l'intérieur de ladite cavité (23).

2. Appareil (1) d'éclairage et de délimitation de route selon la revendication 1, dans lequel ledit système optique réflecteur (44) comprend un corps réfléchissant (45) et une paire d'ailettes (46), ledit corps réfléchissant (45) étant fixé audit circuit imprimé (47) et s'étendant le long de ladite direction longitudinale (A), lesdites ailettes (46), en particulier sensiblement bidimensionnelles et avec une forme triangulaire, étant agencées perpendiculairement à ladite direction longitudinale (A) et accouplées à deux côtés opposés dudit corps réfléchissant (45).
3. Appareil (1) d'éclairage et de délimitation de route selon la revendication 2, dans lequel ledit corps réfléchissant (45) a une section transversale parabolique.
4. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, dans lequel ledit système optique réflecteur (44) est doté de surfaces réfléchissantes faites d'aluminium revêtu d'argent avec de hautes performances.
5. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, comprenant en outre au moins un bouchon borgne (3) avec une surface fonctionnelle (30), dans lequel ladite cavité (23) est dotée d'une ouverture (25) sur au moins un parmi deux côtés (24) opposés l'un à l'autre et transversaux par rapport à ladite direction longitudinale (A), ledit bouchon borgne (3) étant conçu pour être accouplé de manière réversible audit corps central (2) au niveau de ladite ouverture (25).
6. Appareil (1) d'éclairage et de délimitation de route selon la revendication 5, dans lequel ladite surface fonctionnelle (30), lorsque ledit bouchon borgne (3) est accouplé au corps central (2), fait face à l'extérieur à partir de ladite cavité (23) et est destinée à recevoir un système de délimitation de route.
7. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, dans lequel ledit corps central (2) est doté d'un siège externe (20) qui peut être mis en prise par un élément de fixation (27) et est destiné à être fixé d'une manière ajustable et réversible à ladite structure de support (10) afin d'orienter ledit appareil (1) conformément à ladite hauteur d'installation (H) définie.
8. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, dans lequel ladite hauteur d'installation (H) est inférieure à 150 cm, par exemple égale à 80 cm.

9. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, comprenant une pluralité de DEL (41) montées sur un circuit imprimé (47), une lentille de réfraction (43) respective et un système optique réflecteur (44) respectif étant associés à chacune des DEL (41) de ladite pluralité de DEL. 5
10. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, comprenant une pluralité de DEL (41) montées sur des circuits imprimés (47) respectifs, une lentille de réfraction (43) respective et un système optique réflecteur (44) respectif étant associés à chacune des DEL (41) de ladite pluralité de DEL. 10 15
11. Appareil (1) d'éclairage et de délimitation de route selon la revendication 9 ou 10, dans lequel lesdites DEL (41) de ladite pluralité de DEL sont distribuées le long d'une direction parallèle à ladite direction longitudinale (A). 20
12. Appareil (1) d'éclairage et de délimitation de route selon une quelconque revendication précédente, dans lequel ledit corps central (2) a une forme complémentaire de la forme d'une cavité longitudinale (11) de ladite structure de support (10) afin d'être reçu dans cette dernière en une configuration d'ensemble compact (G). 25 30 35 40 45 50 55







REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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